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IN THE U. S. PATENT AND TRADEMARK OFFICE

APPLICANTS: CONF. NO.: Unknown
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FILED: December 22, 2000 EXAMINER: Unknown
FOR: A GENERAL INFORMATION MANAGEMENT SYSTEM

LETTER SUBMITTING TRANSLATION
OF NON-ENGLISH LANGUAGE PROVISIONAL APPLICATION
PURSUANT TO 35 U.S.C. § 119(e) AND 37 C.F.R. 1.78(a)(5)

Assistant Commissioner for Patents
Washington, D.C. 20231

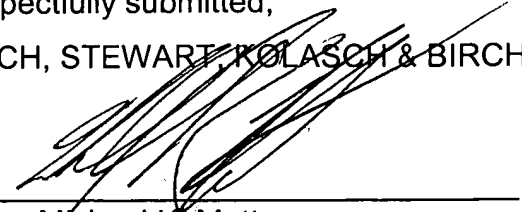
October 1, 2001

Sir:

In accordance with the requirements of 35 U.S.C. § 119(e) and 37 C.F.R. § 1.78(a)(5), attached hereto is a verified English language translation of U.S. Provisional Application Nos. 60/208,169, 60/208,164, 60/208,170, and 60/210,654 filed on May 31, 2000, May 31, 2000, May 31, 2000 and June 9, 2000, respectively. This submission completes the claim for priority of these provisional applications in the above-identified patent application.

If necessary, the Commissioner of hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under § 1.17; particularly, extension of time fees.

Respectfully submitted,
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60/208,169

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VERIFIED TRANSLATION

I, the undersigned Patricia HARDING, BA(Hons),
technical translator to RWS Group plc, of Europa House, Marsham Way, Gerrards Cross,
Buckinghamshire, England, do hereby declare:

(1) That I am well familiar with the Swedish and English languages;
(2) That the attached is a true and accurate translation into the English language of
the Swedish text of this Patent Application entitled "Controlling an Electronic Device" that
was filed in the US Patent and Trademark Office on 31 May 2000.

(3) That all statements made herein of my own knowledge are true and that all
statements made on information and belief are believed to be true; and further that these
statements were made with the knowledge that willful false statements and the like so made
are punishable by fine or imprisonment, or both, under § 1001 of title 18 of the United States
Code and that such willful false statements may jeopardize the validity of the application or
any patent issued thereon.

Dated this 21st day of August 2000


P. HARDING

For and on behalf of RWS Group plc



mmmmmm
60/208,169

UNITED STATES PATENT APPLICATION

OF

PETTER ERICSON

AND

HENRIK HÖGLIND

FOR

CONTROLLING AN ELECTRONIC DEVICE



Field of the Invention

This invention concerns an arrangement and a method for controlling an electronic device.

Background of the Invention

The Applicant's Swedish Patent No. 9604008-4 discloses a reading pen which can be used for recording text by imaging this. The reading pen has an optical sensor which captures a number of images, with partially overlapping content, of the text which is to be recorded. In addition, the reading pen has a processor which puts together the images, identifies the text in the images and stores it in character-coded format. The text can then be transferred to a computer with which the reading pen communicates.

In addition, the Applicant's Swedish Patent No. 9803456-4 discloses an optical mouse which is arranged to position a cursor on a display of a computer.

The reading pen and the optical mouse are two examples of input units which can be used to input information into a computer or to control the function of a computer. Another example of an input unit is a keyboard, which can be used both to enter information and to control the computer by means of various keyboard commands.

A user does not want to have to change between different input units in order to be able to carry out different functions. Therefore it is a general requirement that each input unit is to be able to be used for as many

different functions as possible and in as flexible and simple a way as possible for the user.

Summary of the Invention

An object of this invention is therefore to provide an arrangement for controlling an electronic device which is simple for a user to use and which makes possible a combination with other input unit functions.

This object is achieved by an arrangement according to claim 1.

According to a first aspect, this invention concerns an arrangement for controlling an electronic device comprising an input unit with an optical sensor for recording text by imaging this by means of at least one image, and signal-processing means for identifying predetermined information in the imaged text and for controlling the electronic device dependent upon said predetermined information.

According to the invention the arrangement for controlling an electronic device is based on an input unit function known per se, that is recording of text, which, however, is modified by making the signal-processing means identify predetermined information in the imaged text. Unlike the previously known input unit function, the content of the recorded text is interpreted instead of the text just being stored. A user can thus control the electronic device on the basis of text which is read using the input unit. The text can be predetermined com-

mands which are printed or written on a sheet of paper or some other product. The text can also be text which is used in specific applications in the electronic device, such as addresses. The content in these addresses varies, but the arrangement can recognize predetermined information, for example certain characters, which make it possible for the arrangement to interpret what the text refers to.

The arrangement according to the invention is simple for the user to use, as the user just needs to pass the input unit across the text or place it on the text in order to control the electronic device. In addition the arrangement can easily be combined with other input unit functions which are based on recording of images by an optical sensor.

The signal-processing means are preferably realized as software. However, they can consist of a specially adapted hardware circuit, for example an ASIC, or some suitable combination of software and hardware.

The electronic device which is controlled by means of the arrangement can be a computer, a mobile telephone, a PDA or some similar electronic device.

The optical sensor can be a line sensor, but is preferably an area sensor.

In a preferred embodiment, the predetermined information consists of at least one predetermined character and the signal-processing means are arranged to generate

a command associated with said character for controlling the electronic device. The signal-processing means can be arranged to identify special characters such as @, or predetermined words, word combinations or character combinations. Each such character, word or combination can be associated with a special command. The command can be a command to the electronic device at system or application level. It can emulate a keyboard command. It can also be a special command, for example a user-defined command.

The arrangement can advantageously comprise a reading pen function. The same arrangement can then be used by the user both for controlling the electronic device and for inputting text into it. The reading pen function can advantageously be realized in the same way as in the Applicant's above-mentioned patent. Other realizations are, however, also possible.

In an advantageous embodiment, as an alternative to or a supplement to the reading pen, the arrangement can comprise an optical mouse function for controlling a cursor on a display on the electronic device. The user can then carry out mouse functions using the arrangement and also control the electronic device by recording text. The mouse function can advantageously be realized in the same way as in the Applicant's above-mentioned patent. Other realizations are, however, also possible.

The arrangement can advantageously be changed between at least a first function mode, for example the reading pen or mouse function, and a second command mode, in which the signal-processing means are arranged to carry out said identification of predetermined information in the recorded text and control of the electronic device. This embodiment has the advantage that it simplifies the arrangement, as it only needs to interpret text in command mode. The danger of text which is only intended to be entered and stored in the electronic device being wrongly interpreted as a command is also avoided.

As an alternative, the signal-processing means should be able to interpret continuously the content in the text recorded by the optical sensor. In order to avoid words being interpreted as a command which are only intended to be entered and stored in the electronic device but which consist of the same character combination as a command, additional requirements can be made regarding what the signal-processing means are to interpret as a command. For example, it can be required that commands are to consist of characters in a particular font, font size or the like.

In one embodiment the signal-processing means are at least partially located in the same casing as the electronic device. By this means the input unit can be made simpler and cheaper. In addition the processor power which is already available in the electronic device can

be utilized in order to carry out the functions of the signal-processing means. Certain processing of the recorded text can, however, advantageously be carried out in the input unit, for example localization of the text in the image or images and conversion of the text to character-coded format, for example ASCII code, so that a smaller amount of information needs to be transmitted from the input unit to the electronic device.

In a less preferred embodiment the signal-processing means can be completely integrated with the input unit so that the electronic device receives one or more commands directly from the input unit. In another less preferred embodiment the input unit can just record images and transfer these to the signal-processing means which carry out all the processing of the images.

The input unit is advantageously arranged to communicate with the electronic device by wireless means, so that the use of the input unit is as flexible as possible and so that certain functions can be used stand-alone. Alternatively, communication via a cable could be possible, for example across a USB.

In a particularly preferred embodiment the signal-processing means are arranged in such a way that when they identify an address for electronic mail in the recorded text, the electronic device is caused to open a program for electronic mail. The arrangement preferably causes the device not just to open the program but also

to open a template for electronic mail. It is even more preferable for the template to be opened with the recorded e-mail address already entered in the address field.

The identification of the e-mail address can, for example, be carried out by recognition of @, the signal-processing means interpreting all the characters which are associated with @ as part of the address.

In addition the signal-processing means can advantageously be arranged so that when they identify a web address in the recorded text the electronic device is caused to open a web search program. The device is preferably caused not just to open the program but also the web page corresponding to the web address. The identification of the web address by the signal-processing means can, for example, be based on recognition of the character combination "http://" or "www", the signal-processing means interpreting all the characters which are associated with said character combination as part of the web address. In this way the user can simply and quickly open a web page by using the same input unit he or she uses for other input unit functions.

In addition the signal-processing means can advantageously be arranged so that when they identify a telephone number in the recorded text, the electronic device is caused to ring the telephone number.

As mentioned above, the signal-processing means can create a predetermined command upon recognition of one or

more predetermined characters or words in the recorded text. The predetermined words can quite simply be designation of the commands which are created. For this purpose the arrangement can advantageously comprise a product by means of which a number of command indications are shown. The command indications can advantageously be represented by character combinations which are easy for the user to understand. The product can, for example, be a mouse pad.

According to a second aspect of the invention, this concerns a method for controlling an electronic device, comprising the steps of recording text by means of a hand-held input unit by imaging this by means of at least one image, identifying predetermined information in the imaged text, and controlling the electronic device depending upon the imaged text.

The advantages of this method are apparent from the discussion of the arrangement. Where appropriate, characteristics of the arrangement also apply for the method.

In the Applicant's Swedish Patent Application No. 9803455-6 an input unit is also known which has both an image-based mouse function and an image-based input function. The function of the input unit is changed by the user pressing buttons.

An additional object is to simplify the use of an input unit which has two functions so that the change between different functions can be carried out in a con-

venient way for the user. This object is achieved by means of a device according to claim 13.

More specifically, according to a third aspect, the invention comprises an input unit which has at least a first and a second function. The input unit comprises image-capturing means, for example an optical sensor, for capturing images and image-processing means, for example a processor, for processing the images to achieve the above-mentioned two functions. The input unit is arranged to change from the first to the second function when the image-processing means detect predetermined information in one of said images.

The predetermined information can in principle be any information which makes it possible for the input unit to interpret that it is to change from a current function to a new function. The information can, for example, consist of one or more predetermined characters, symbols, words, text in special font or line thickness or the like. When the input unit identifies the predetermined information, it automatically changes to the required function. In this way the user does not need to press any buttons.

In a preferred embodiment, the predetermined information is a predetermined pattern. If the input unit, for example, has a mouse function and another function, it can be programmed to be able to identify the pattern on a mouse pad. When the user places the input unit on the

mouse pad, the image-capturing means record an image of the pattern on the mouse pad. The image-processing means identify the pattern as predetermined information which indicates mouse function and the input unit changes automatically to mouse function and processes the images to achieve the mouse function.

It is, of course, convenient if the input unit is also arranged to change from the second function to the first function when it detects other predetermined information. If the input unit has only a mouse function and an input function, it can, for example, change back from the mouse function to the input function when the image-processing meant detect that the predetermined pattern for the mouse function is no longer present in the captured images. Alternatively, the change can be carried out on the basis of positive identification of another predetermined pattern.

In an advantageous embodiment, the predetermined information consists of a position-coding pattern, preferably an absolute position-coding pattern.

The advantage of position-coding patterns is that the predetermined information can consist of one or more specific positions. This makes it easier for the device to identify when it is to change, as it does not need to carry out any character recognition (OCR).

Absolute position-coding patterns are known for example from US 5,852,434 and the Applicant's SE 9901953-1 and

9903541-2 which were not publicly available at the time of the filing of the present application.

The functions between which the change is made can, for example, be a mouse function, a scanner function, a handwriting/hand-drawing function or some similar function which can be carried out on the basis of captured images.

Brief Description of the Drawing

This invention will now be described in greater detail by means of one embodiment with reference to the accompanying drawing in which the figure shows schematically how an arrangement according to the invention can be constructed and used.

Description of a Preferred Embodiment

An embodiment of the arrangement is described below which comprises a mouse function, a scanner or reading pen function and a control function which is based on text recording.

The figure shows a mouse pad 100, an electronic device 200 in the form of a computer and an input unit 300 for the computer.

The mouse pad has a working field 100 with an irregular pattern (not shown) which makes it possible to determine the relative positions of two images which have partially overlapping contents by means of the content of the images, and a command field 120, in which a number of predetermined commands are indicated.

The input unit 300 has a casing 1 in the shape of a pen. One short side of the casing has a window 2 through which images are captured for the different image-based functions of the input unit.

The casing 1 contains principally an optics part, an electronics part and a power supply.

The optics part comprises a number of light emitting diodes 6, a lens system 7 and an optical sensor 8 which constitutes the interface with the electronics part.

The light emitting diodes 6 are intended to illuminate a surface which is at the moment below the window.

The lens system 7 is intended to project an image of the surface which is below the window 2 onto the light-sensitive sensor 8 in as correct a way as possible. The optical sensor 8 can consist of a two-dimensional quadratic CCD unit (CCD = charge-coupled device) with a built-in A/D transducer. Such sensors are commercially available.

The power supply for the input unit is obtained from a battery 12.

The electronics part comprises a processor 20 with conventional associated circuits, such as various types of memory, and associated programs for carrying out the functions described here. The electronics part also comprises a transceiver 26 for transmitting information to/from the computer 200. The transceiver can be based on infrared technology or radio technology for transmission

over short distances, for example in accordance with the Bluetooth standard. The electronics part further comprises buttons 27, by means of which the user can control the input unit and in particular change the input unit between the mouse function, the scanner function and the control function. When the mouse function is being used the buttons can also have functions which correspond to the click buttons on a traditional mouse.

The computer 200 is an ordinary personal computer with circuits and programs which make possible communication with the input unit 300. However, in this embodiment this also contains signal-processing means which constitute part of the arrangement for controlling its function. The signal-processing means consist of a program which is installed in the computer. This is shown symbolically by broken lines and reference numeral 210.

As mentioned, the input unit 300 has a scanner function, a mouse function and a control function.

The scanner function is used to record text. The user passes the input unit across the text which he wants to record. The optical sensor records images with partially overlapping contents. The images are put together by the processor 20. Each character in the put-together image is localized and, using for example neural network software in the processor, it is determined to which ASCII character the character corresponds. The text converted in this way to character-coded format can be stor-

ed in the input unit or transferred to the computer 200. The scanner function is described in greater detail in the Applicant's Swedish Patent No. 9604008-4.

The mouse function is used to control a cursor on the display 201 of a computer 200. The mouse function is also image-based in this embodiment. When the input unit 300 is moved across the working field 110, the optical sensor 8 records a number of images with partially overlapping images. The processor 20 determines positioning signals for the cursor of the computer 200 on the basis of the relative positions of the recorded images, which are determined by means of the contents of the images. The mouse function is described in greater detail in the Applicant's Swedish Patent No. 9803456-4.

The control function is based on the scanner function. The user records text in the same way as in the scanner function. The text is sent in character-coded format from the input unit's transceiver to the signal-processing means 210 in the computer 200, together with an indication that this is control information which is to be interpreted. The signal-processing means examine the received text and search for predetermined information in this in the form of predetermined characters and character combinations. When such predetermined information is found, the signal-processing means create predetermined commands to the computer as a function of the predetermined information.

The arrangement described above is used in the following way. First assume that the user wants to use the input unit as a mouse. He selects the mouse function by means of the buttons 27. By moving the input unit on the working field he controls the cursor on the display 201 of the computer 200. Assume next that the user edits a document in the computer 200. He can then mark text by "clicking" with the buttons 27. Assume that the user first wants to replace a first piece of text with a second piece of text which is situated elsewhere in the text. The user marks the second piece of text using the input unit. Then he changes the input unit to the control function and records the command "cut" by passing the input unit across this command on the mouse pad 100. The input unit then sends the character-coded text "cut" to the signal-processing means 210 in the computer 200, which identify the text as a command and create a corresponding command for the word-processing application concerned, which cuts out the marked piece of text. The user next marks the first piece of text using the input unit and then causes the computer to paste the cut-out piece of text in place of the marked text by recording the command "paste" using the input unit.

Now assume that the user next wants to enter text from a newspaper in his document. He first positions the cursor in the required place using the mouse function of the input unit. Then he changes the input unit to the

scanner function and scans in the text from the newspaper. The text is converted to character-coded format and transmitted to the signal-processing means which insert the text in the position marked by the cursor.

Now assume that the user sees an interesting web address in the newspaper he is reading and wants to look at this web page. He then changes the input unit to control function and reads off the web address from the newspaper. The recorded text is transferred to the signal-processing means which identify the character combination "http://" and cause the computer to open the web page with the recorded address.

Finally, assume that the user wants to send an e-mail to a friend. He uses the control function of the input unit to record the command "e-mail" on the mouse pad. Recognition of this command by the signal-processing means results in the means generating a command to the computer which causes it to open the e-mail program. The user can then record the required e-mail address and even the content of the message using the scanner function.

As shown above, the user can conveniently carry out a number of different functions which comprise inputting information and controlling the computer 200 by means of just one input unit.

Of course, other functions can be integrated into the input unit in order to further increase its usability. An example is a function to record handwritten text,

which is described in the Applicant's Swedish Patent No. xxxxxxxx.

Other commands can be created in addition to those described above. A user can also himself define how recorded text is to be interpreted by the signal-processing means and in which control of the computer a particular recorded piece of text is to result.

The change described above between the different functions is carried out by the user pressing buttons on the input unit.

As an alternative to this, the input unit can itself detect that it is to change between different functions.

The input unit can, for example, be arranged to search for predetermined information in each image which is captured by the optical sensor 8. The predetermined information can, for example, be the pattern on the working field 120 of the mouse pad. When the processor 20 detects this pattern, it changes to the mouse function and processes the images in the way described above to provide positioning signals for the cursor on the display 201 of the computer 200. When the user thereafter places the input unit on a newspaper in order to scan in text, the processor 20 no longer detects the mouse pad pattern and so it knows that it is to change to the scanner function and process the images in the way described above for the identification of text and conversion of imaged text to character-coded format. This technique can also

be used for changing to the control function. The commands in the mouse pad's command field can be written in a particular way so that the processor can detect that the characters are not characters which are to be entered into the computer by the scanner function, but are characters which represent commands and are to be sent to the signal-processing means in order to be processed as such. The commands can, for example, be written in a particular size, particular font or particular line thickness.

As another example, the change can be implemented on the basis of change commands which are written in the command field of a mouse pad. When the user wants to change to scanner function he records the word "scanner" from the command field using the input unit. The processor 20 identifies this as predetermined information which indicates that it is now to carry out a scanner function.

Above the pattern on the mouse pad 100 is described as an irregular pattern and the mouse function is described as being achieved by determination of the relative position of the recorded images. In another embodiment, the pattern on the mouse pad can be a position-coding pattern, which systematically codes positions over the whole of the mouse pad. In this case the mouse function can be based on reading off positions using the position-coding pattern. In addition the change to mouse function can be based on recognition of the position-coding pattern. In addition particular positions or posi-

tion areas (also called domains) can be dedicated to particular functions, for example those corresponding to the different commands in the command field. When the processor detects a particular position, it determines which function corresponds to this position. In this way the input unit can be caused to change from one function to another function by placing it in a particular position on the mouse pad. Different domains of the position-coding pattern can also be dedicated to commands for controlling the computer 200. Instead of the signal-processing means in the computer 200 detecting predetermined information in the text which is entered, they can thus detect positions in the form of coordinates and identify which command is to be created to control the computer 200. For example, if the user wants to open the e-mail program in the computer 200, he can place the input unit on the mouse pad in a position where it says "e-mail". The optical sensor 8 records an image of the position-coding pattern in this position. The processor identifies which position, that is which coordinates, corresponds to the position-coding pattern in the image. It sends the coordinates to the signal-processing means in the computer 200. The signal-processing means identify that these coordinates mean that they are to create a command to the computer which causes it to open the e-mail program.

The mouse pad can thus be divided into position areas or domains with different functions. An additional example of this is that one area can be dedicated to relative mouse function (the cursor is moved in the same way as the input unit) and another area to absolute mouse function (the cursor is placed in the position which corresponds to the position of the input unit on the mouse pad). The input unit itself understands which function it is to use on the basis of whether the position-coding pattern (and hence the identified coordinates) belongs to one or the other area. Of course, alternatively the same surface can be used for the relative and absolute functions and the change can be carried out by means of change commands in the way described above.

A further example is that the mouse pad can have an area which is dedicated to a scrolling function. The input unit can thus be a mouse with various mouse functions. It can also be a mouse which, in addition to controlling a cursor on a computer, can control other functions of the computer or other electronic devices, such as mobile telephones or PDA.

The above example is just one example of how the arrangement according to the invention can be designed. Based on the summary of the invention, experts in the field can achieve a number of variants of this example.

What we claim and desire to secure by Letters Patent is:

1. An arrangement for controlling an electronic device, characterized by an input unit with an optical sensor for recording text by imaging this by means of at least one image, and signal-processing means for identifying predetermined information in the imaged text and for controlling the electronic device dependent upon said predetermined information.

2. An arrangement according to claim 1, wherein the predetermined information consists of at least one predetermined character and wherein the signal-processing means are arranged to generate a command associated with said character for controlling the electronic device.

3. An arrangement according to claim 1 or 2, which arrangement comprises a reading pen function.

4. An arrangement according to any one of the preceding claims, which arrangement comprises an optical mouse function for controlling a cursor on a display on the electronic device.

5. An arrangement according to any one of the preceding claims, which arrangement can be changed between at least a first function mode and a command mode, in which the signal-processing means are arranged to carry out said identification of predetermined information in the recorded text and control of the electronic device.

6. An arrangement according to any one of the preceding claims, in which the signal-processing means are at least partially located in the same casing as the electronic device.

7. An arrangement according to any one of the preceding claims, wherein the input unit is arranged to communicate with the electronic device by wireless means.

8. An arrangement according to any one of the preceding claims, wherein the signal-processing means are arranged in such a way that when they identify an address for electronic mail in the recorded text, they cause the electronic device to open a program for electronic mail.

9. An arrangement according to any one of the preceding claims, wherein the signal-processing means are arranged in such a way that when they identify a web address in the recorded text, they cause the electronic device to open a web search program.

10. An arrangement according to any one of the preceding claims, wherein the signal-processing means are arranged in such a way that when they identify a telephone number in the recorded text, they cause the electronic device to phone the telephone number.

11. An arrangement according to any one of the preceding claims, comprising a product on which a number of command words are indicated.

12. A method for controlling an electronic device, comprising the steps:

recording text by means of a hand-held input unit,
by imaging this by means of at least one image,

identifying predetermined information in the imaged
text, and

controlling the electronic device dependent upon the
imaged text.

13. An input unit with at least a first and a second
function, comprising image-capturing means for capturing
images and image-processing means for processing the
images to achieve said two functions, c h a r a c t e r -
i z e d in that the input unit is arranged to change from
the first to the second function when the image-process-
ing means detect predetermined information in one of said
images.

14. An input unit according to claim 13, wherein
said predetermined information is a predetermined pat-
tern.

15. An input unit according to claim 13 or 14,
wherein the input unit is arranged to change from the
second function to the first function when it detects
other predetermined information.

16. An input unit according to any one of claims
13-15, wherein said predetermined information consists of
a position-coding pattern, preferably an absolute
position-coding pattern.

17. An input unit according to any one of claims 13-16, wherein the first function is a mouse function and the second function is an input function, preferably a scanner function.

Abstract of the Disclosure

An arrangement for controlling an electronic device has an input unit with an optical sensor for recording text by imaging this using at least one image, and signal-processing means for identifying predetermined information in the imaged text and for controlling the electronic device dependent upon said predetermined information.

